Validation for AIRS

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Validation Plans

- A trial version is set up on a website
- Orbit-net.nesdis.noaa.gov/crad/ipo
- Capabilities
  - View granules from team exercise - Uses IDL from Ed Olsen
  - View ACARS reports
  - View monthly statistics TOVS up through NOAA 14
  - View data as a function of time, angle etc.
  - View the HDF format specification

Data

- Current
  - Radiosondes
  - Buoys
  - Aircraft
  - Hourly surface observations
  - Other satellites
  - Forecasts/analysis
- Planned
  - GPS moisture
  - Ozone
  - Upper atmospheric temperatures
  - ARM data

Data - continued

- Moisture
  - Current upper atmospheric measurements should be more accurate than radiosondes even though the same sensor is used due to compression/heating
  - Current aircraft moisture may be difficult
    - Data are available
    - Uses the Viasalla sensor
    - Ages with time and need calibration
    - Adjusted data available from NCAR, but online data has issues
  - Starting to deploy an advanced sensor
    - Better upper atmospheric measurements
    - Uses a small absorption cell

Radiosonde files

- Radiosonde data
- Hourly surface temperatures
- SST if available
- AIRS data
- AIRS retrievals
  - Bias adjusted
  - Unadjusted
- Aircraft reports

Format

- Truth points to satellite data
- Use existing formats as much as possible
  - Match the RTM for retrievals
  - Use Mitch's for satellite radiances
- Putting Dec. 10 data in the format
- Exchange with Larrabee

Data exchanges

- Get initial data and locations from Mitch
- Get NCEP PREPQC
- Extract matches
- Get match locations from Mitch
- Get team retrieval information from JPL
  - Retrieval with bias removed
  - Retrieval without bias removal
- Combine all information
- Send match file to JPL
- Send match file to UMBC
- Add data such as ozone and rocketsondes as available

Approach

- Online display of frequent analysis
- Considering – download of small match sets
- Downloads to selected sites
  - UMBC
  - Goddard
  - JPL

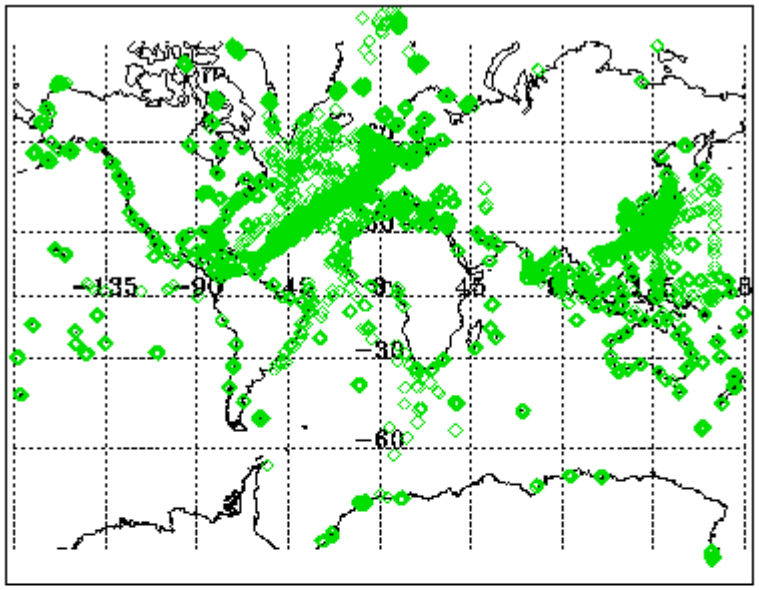
Capabilities

- Intercompare satellites
- Error as a function of
  - time
  - time difference defined as (satelite - radiosonde)
  - collocation distance between the satellite and the radiosonde
    - equator or pole
    - east or west
  - solar zenith angle
  - scan angle
  - level
  - radiosonde type
  - location

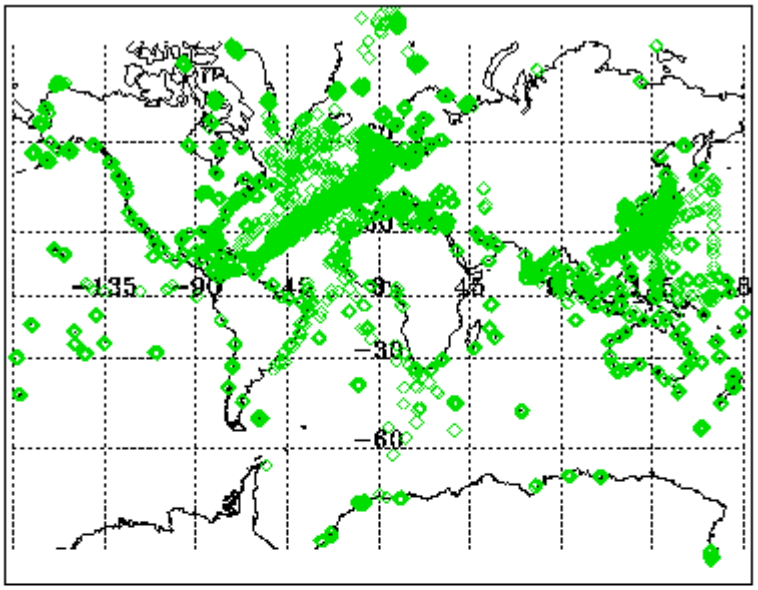
Mystery for the Moment

- Ship radiosondes are in the NESDIS files but not JPL
  - The next two slides show the locations of the raobs in the HIRS operational match file
    - One shows ocean locations
    - One shows the land locations

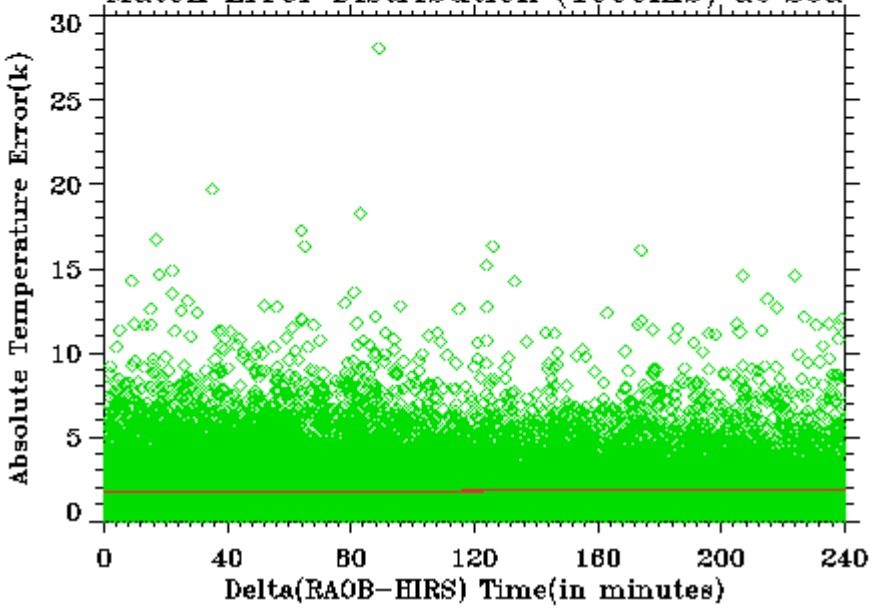
Radiosonde Match Locations in Mercator Projection



Radiosonde Match Locations in Mercator Projection



Match Error Distribution (1000mb) at Sea



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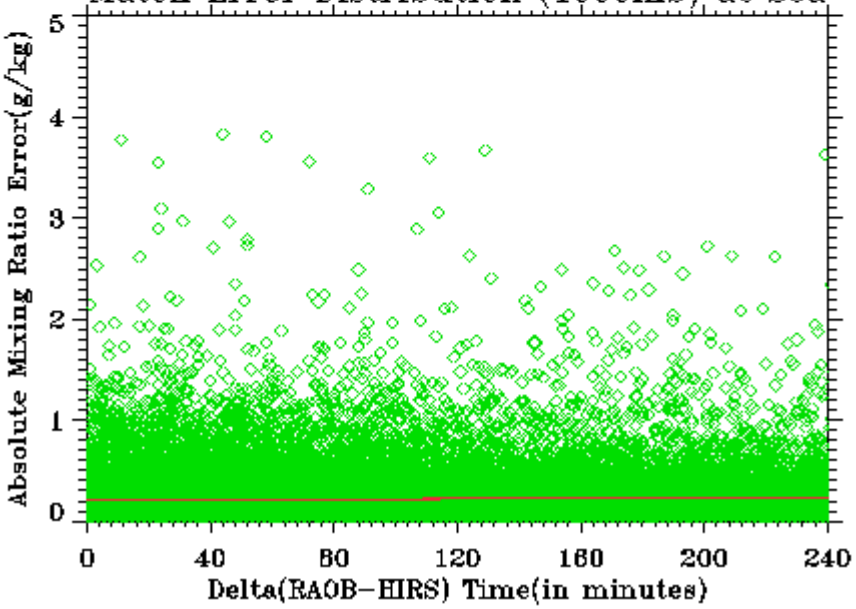

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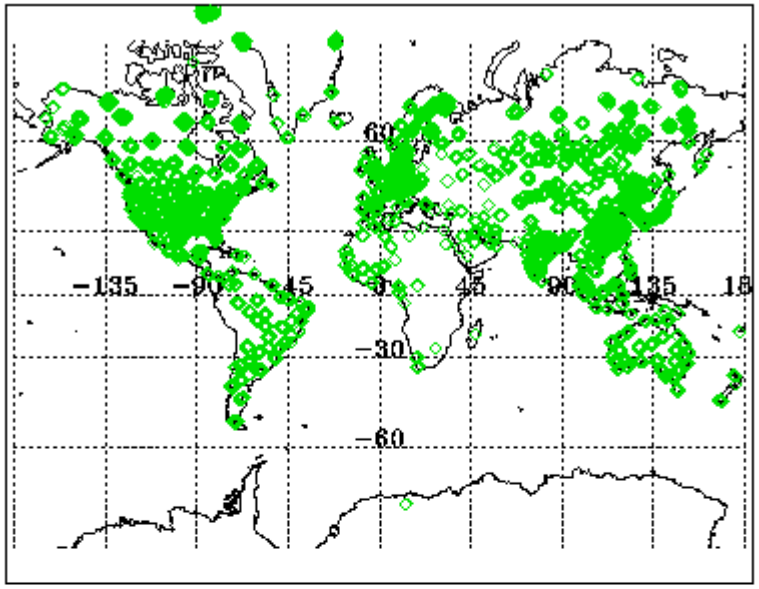
Radiosonde Match Locations in Mercator Projection



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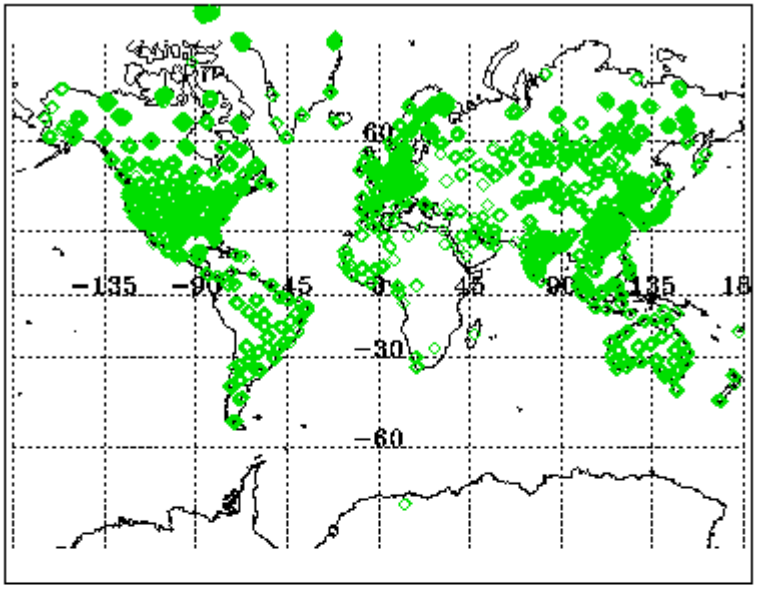
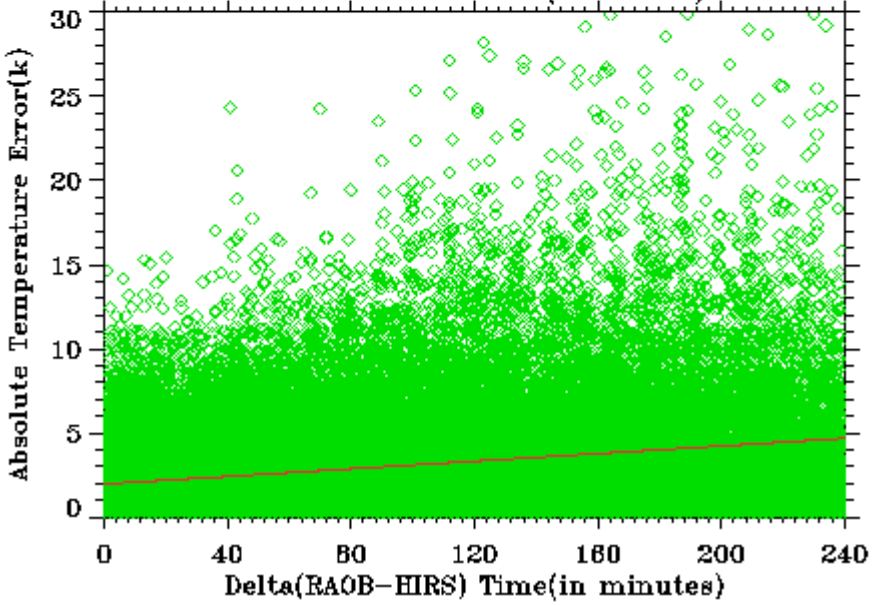
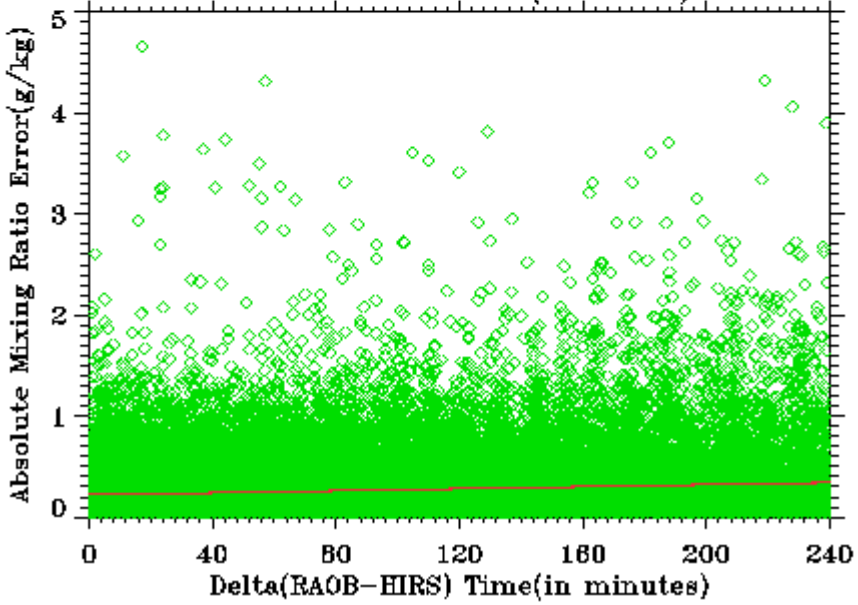


Match Error Distribution (1000mb) at Land



Match Error Distribution (1000mb) at Land



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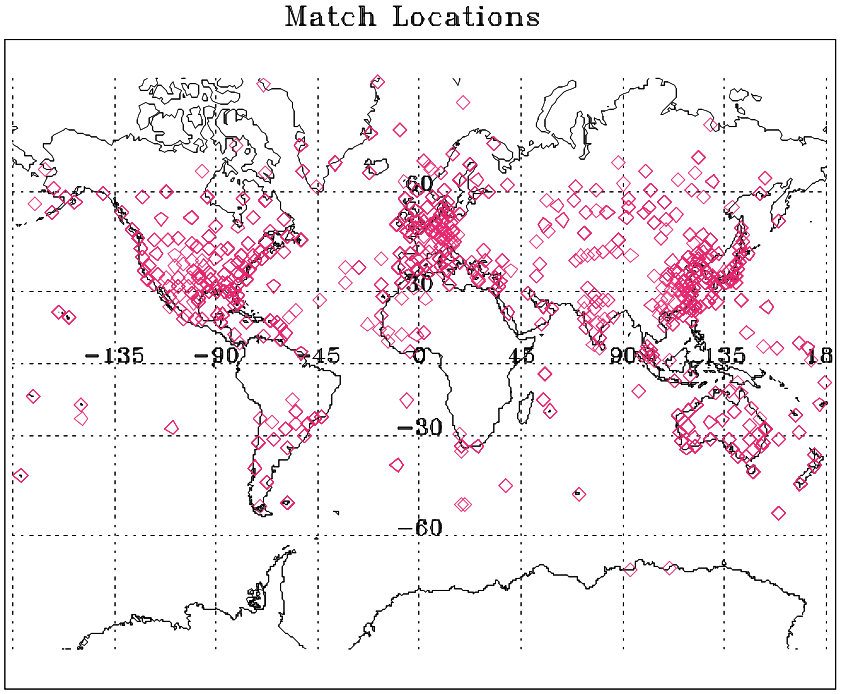
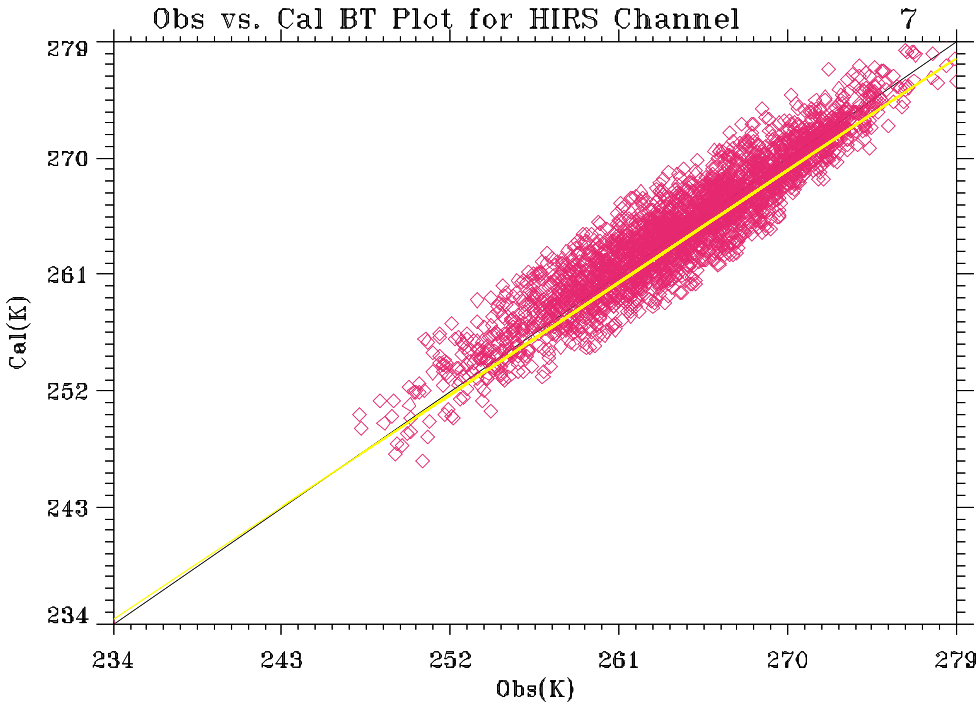
Slide Description

- The next 2 slides show the match between calculated and observed radiances





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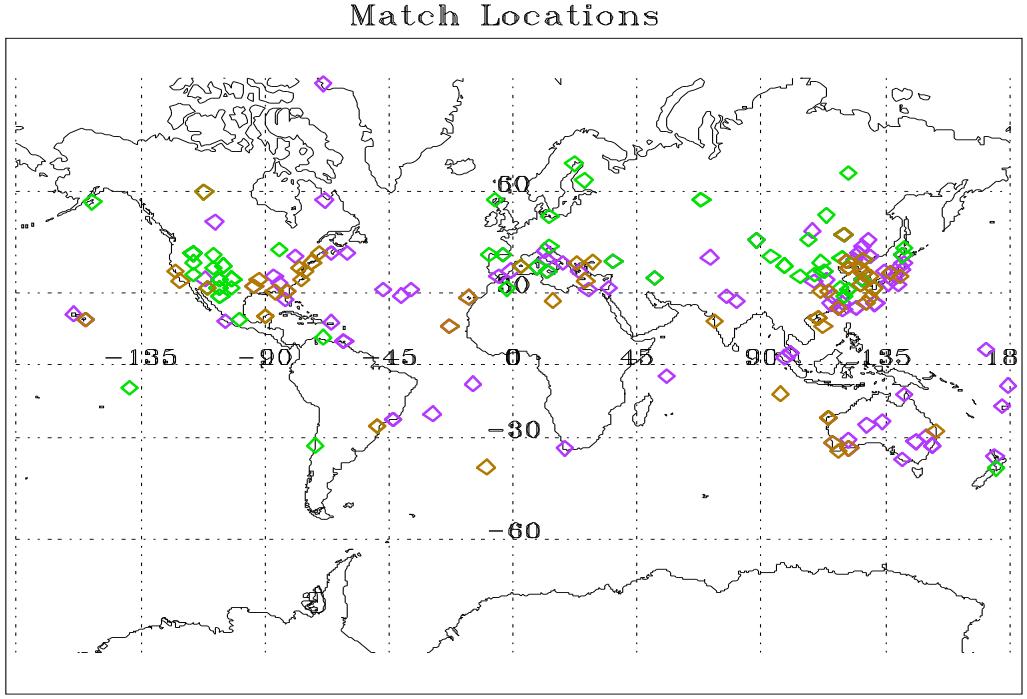

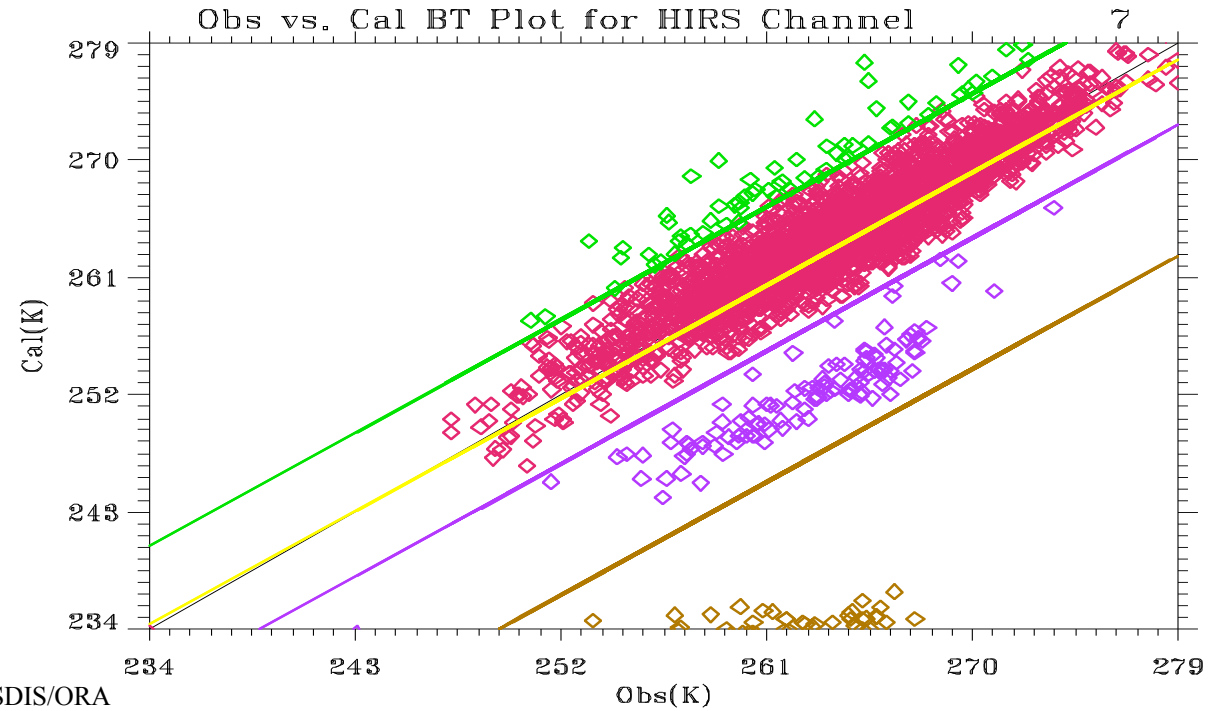

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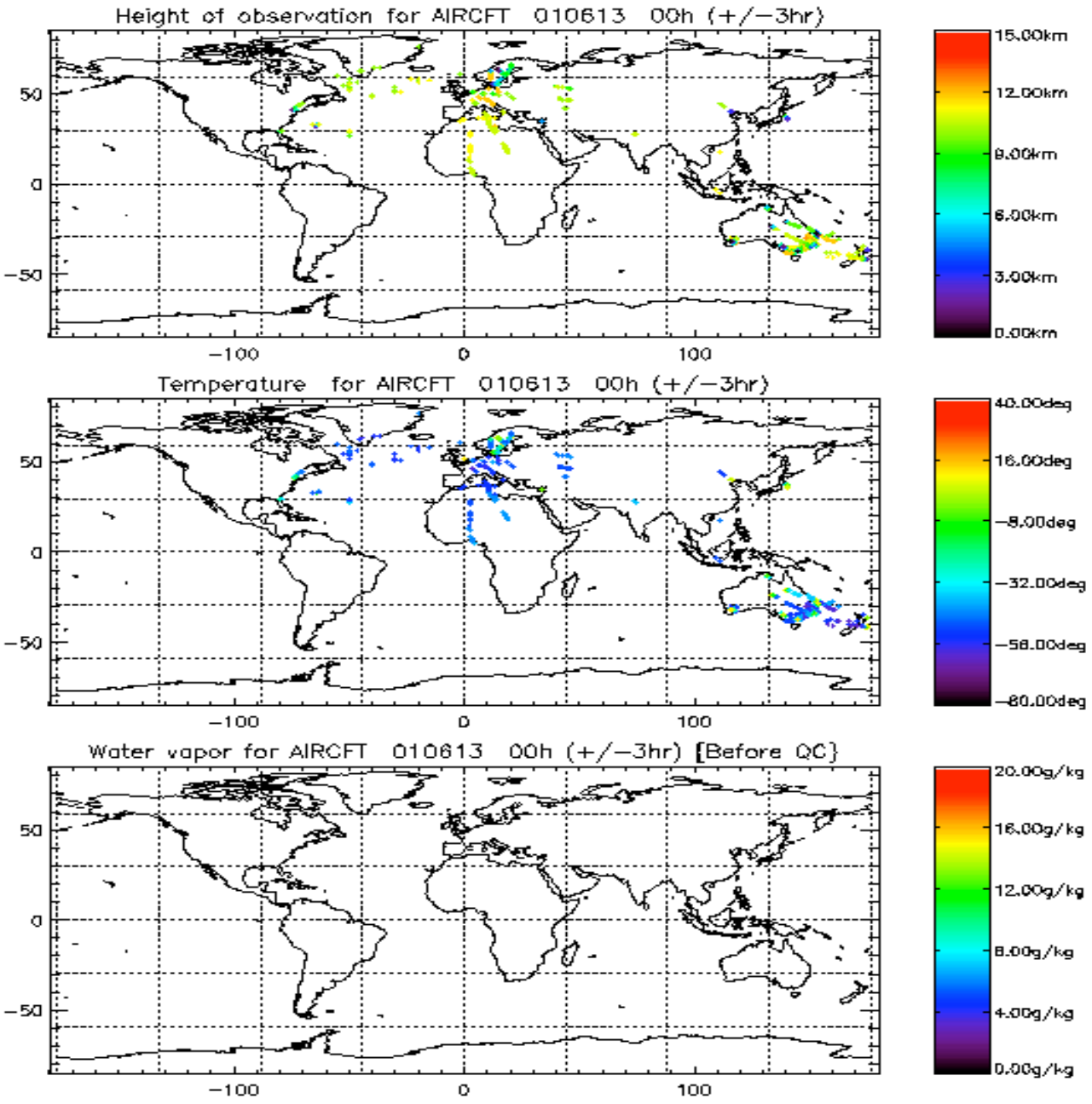
Slide Description

- The next two slides show the aircraft reports for
  - The European carriers
  - The US carriers



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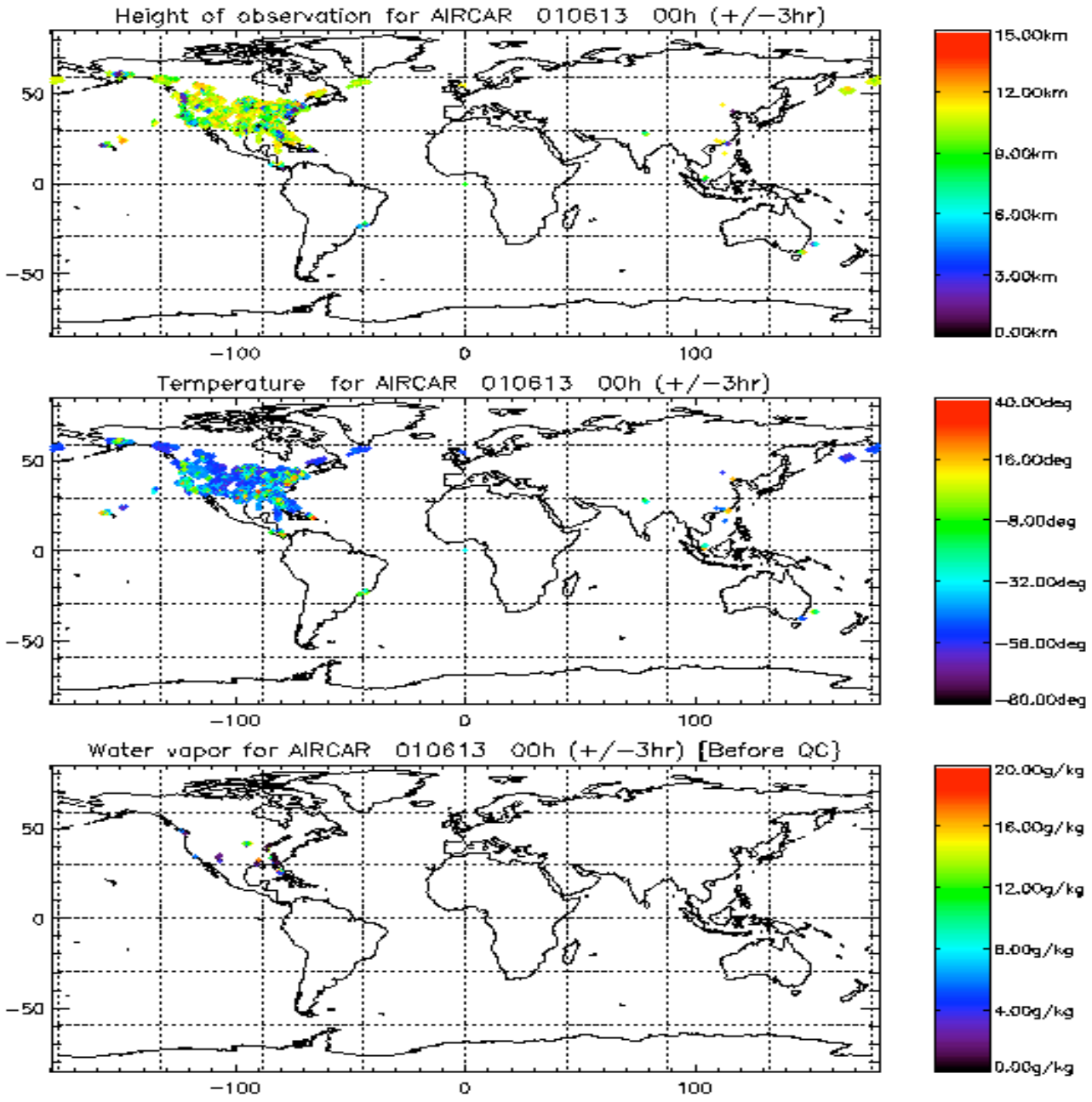

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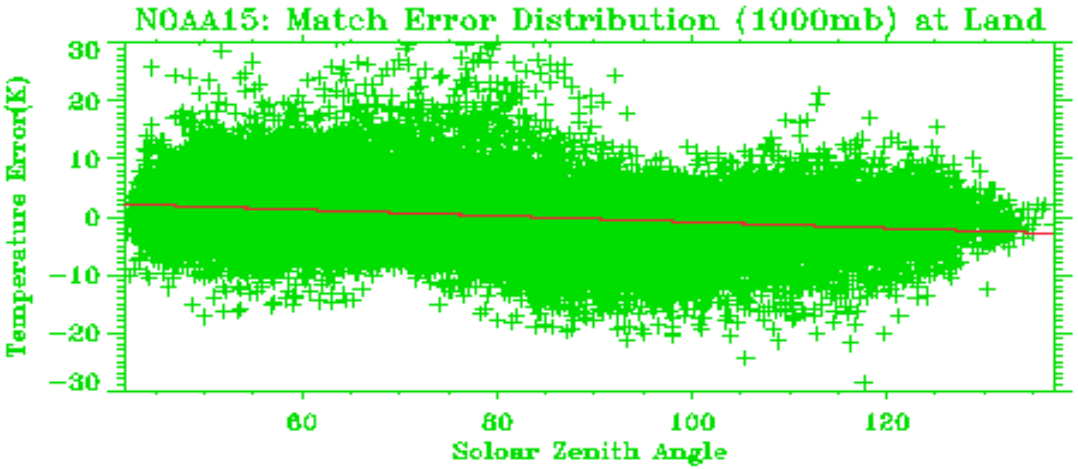

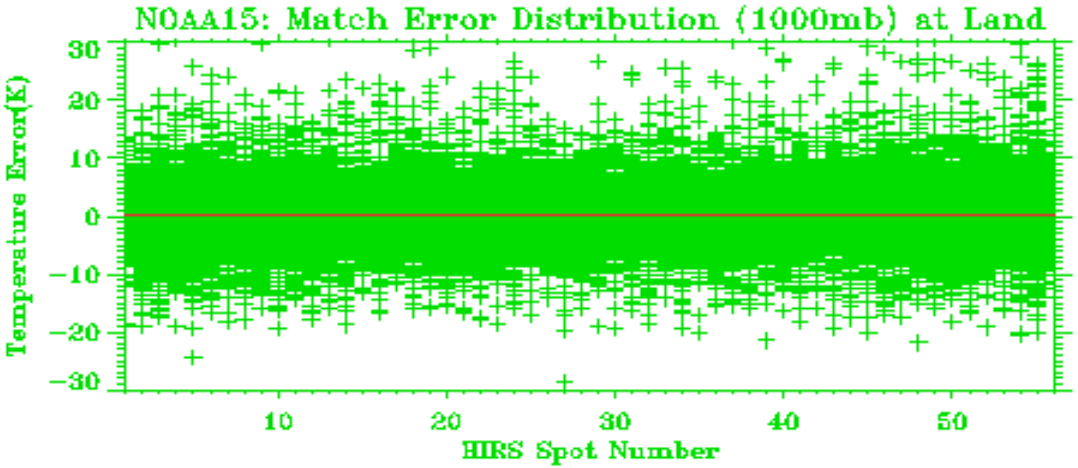

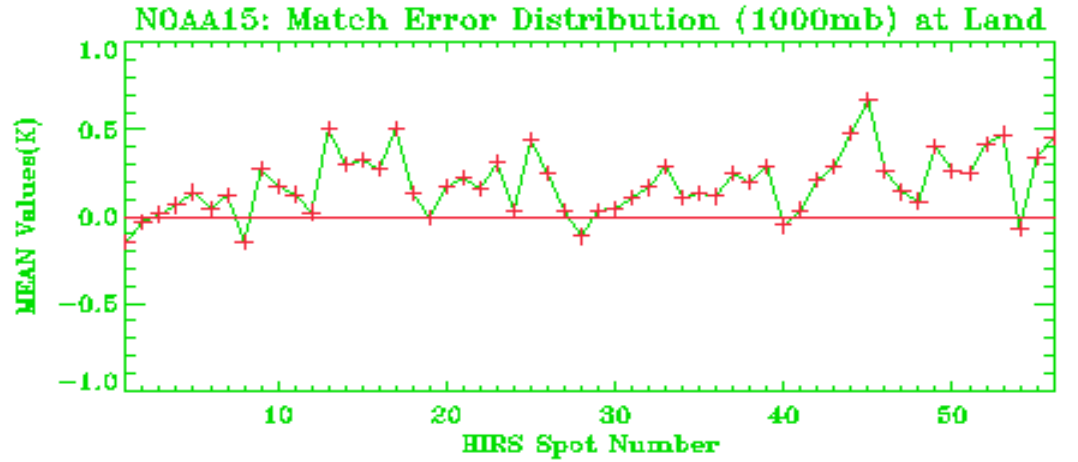

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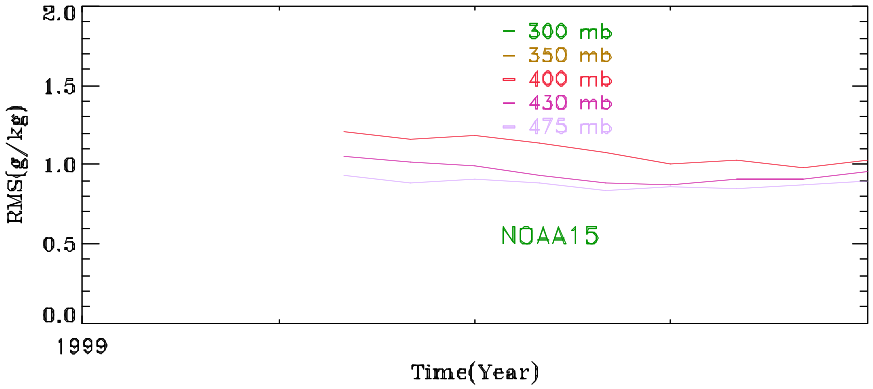

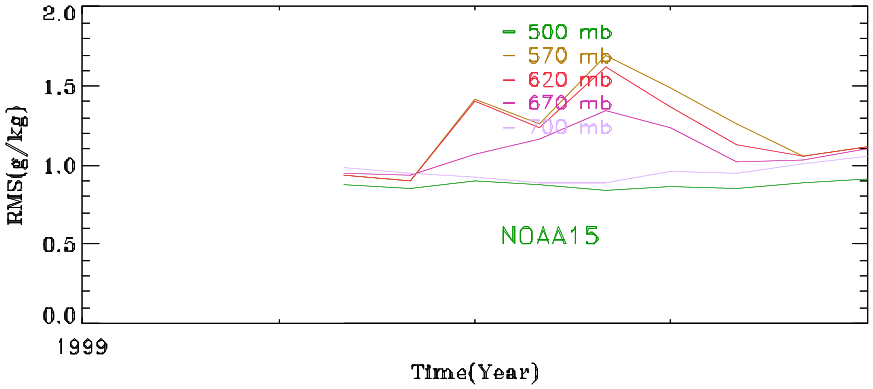

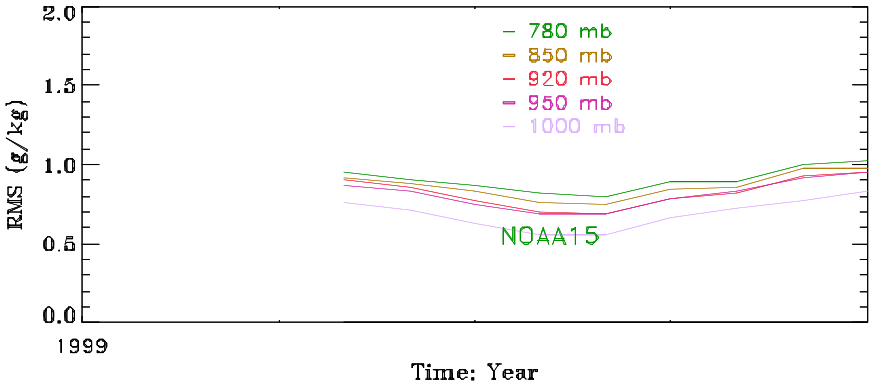

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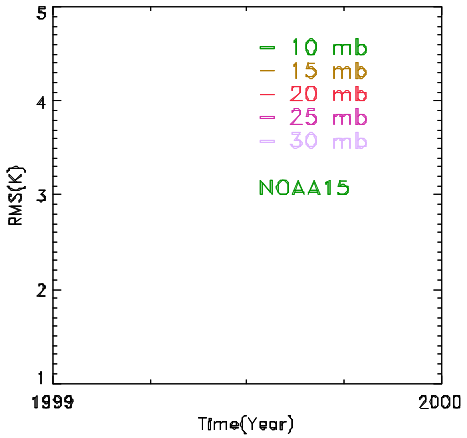
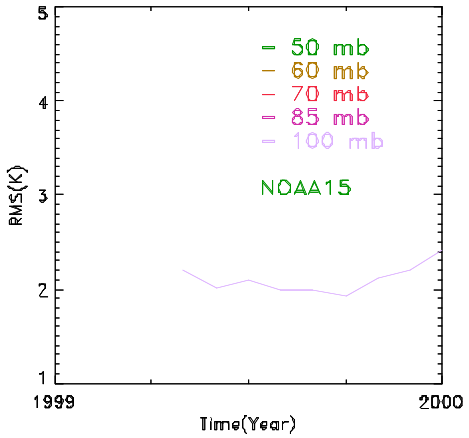
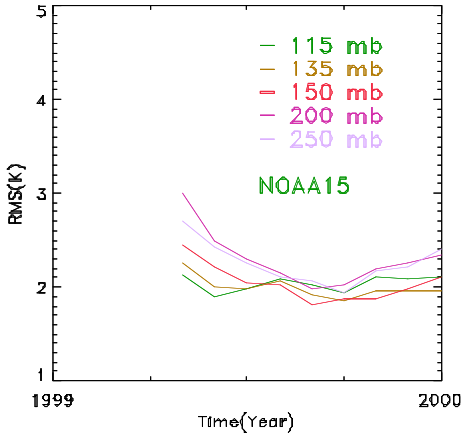
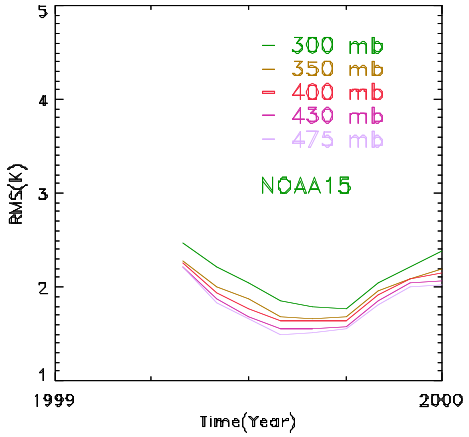
Slide Description

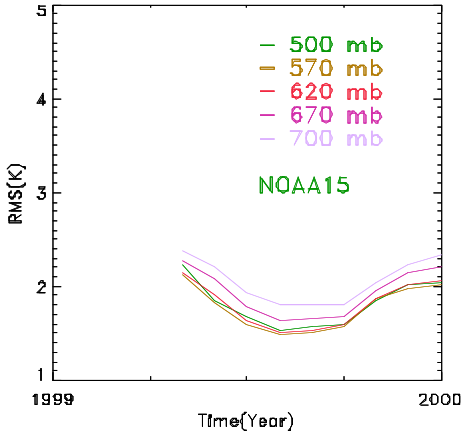
- The next slide shows accuracy as a function of time
  - NOAA 15
  - Note the typical increase in accuracy in the NH summer

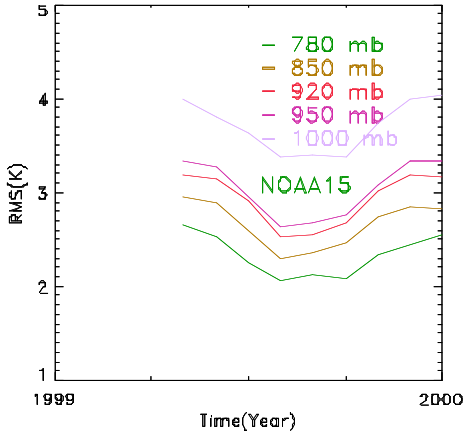












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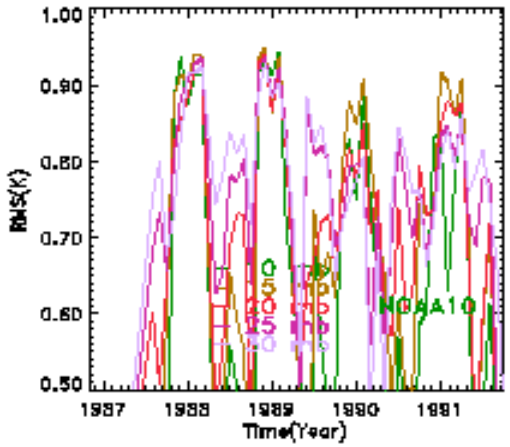

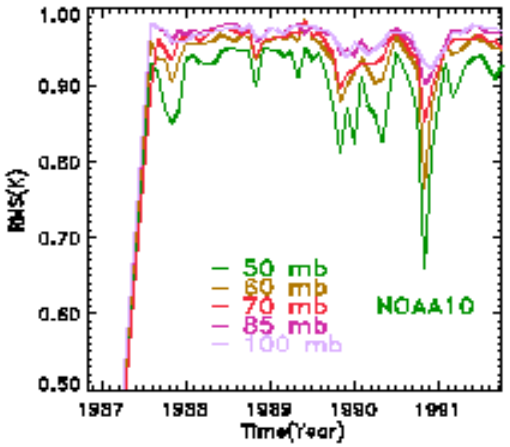

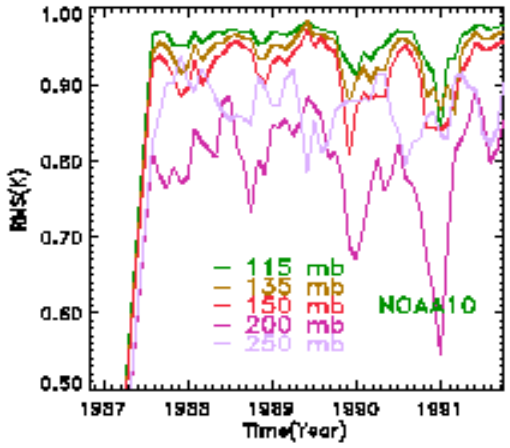

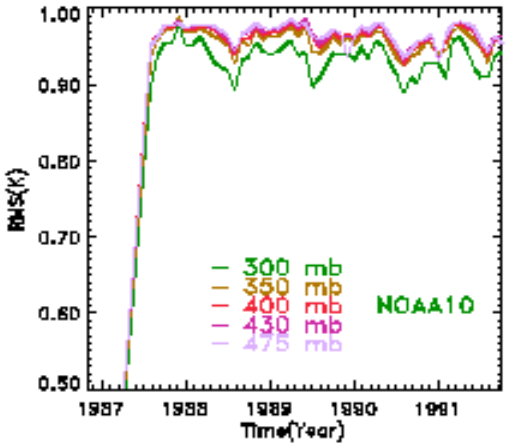

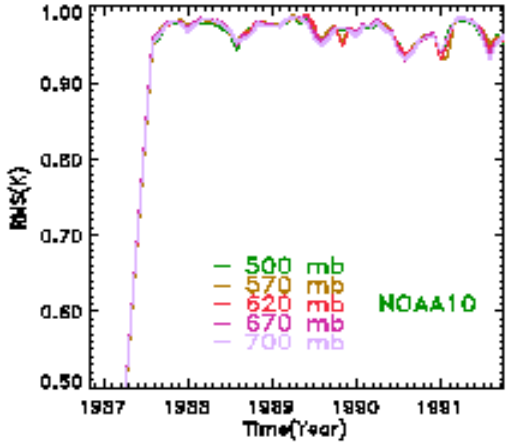

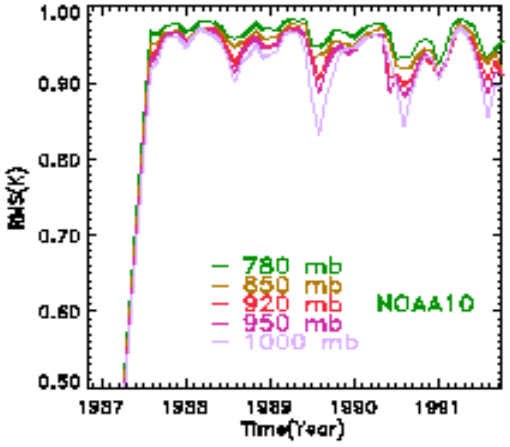

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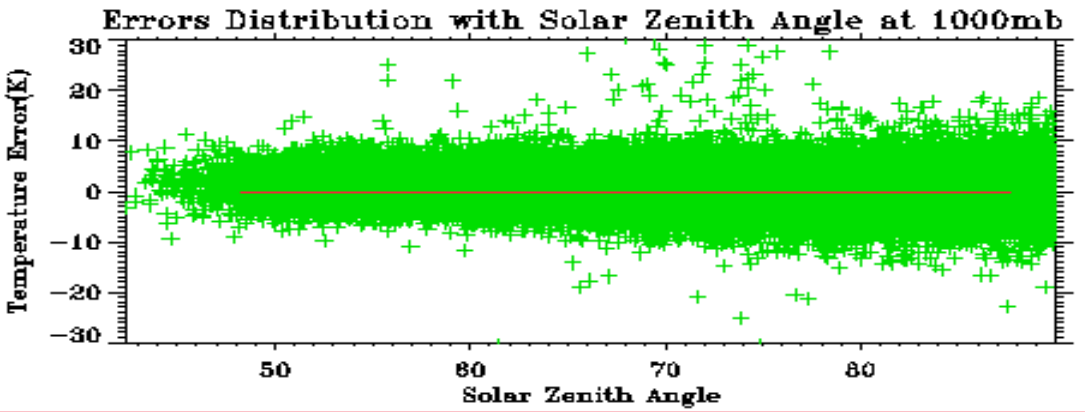

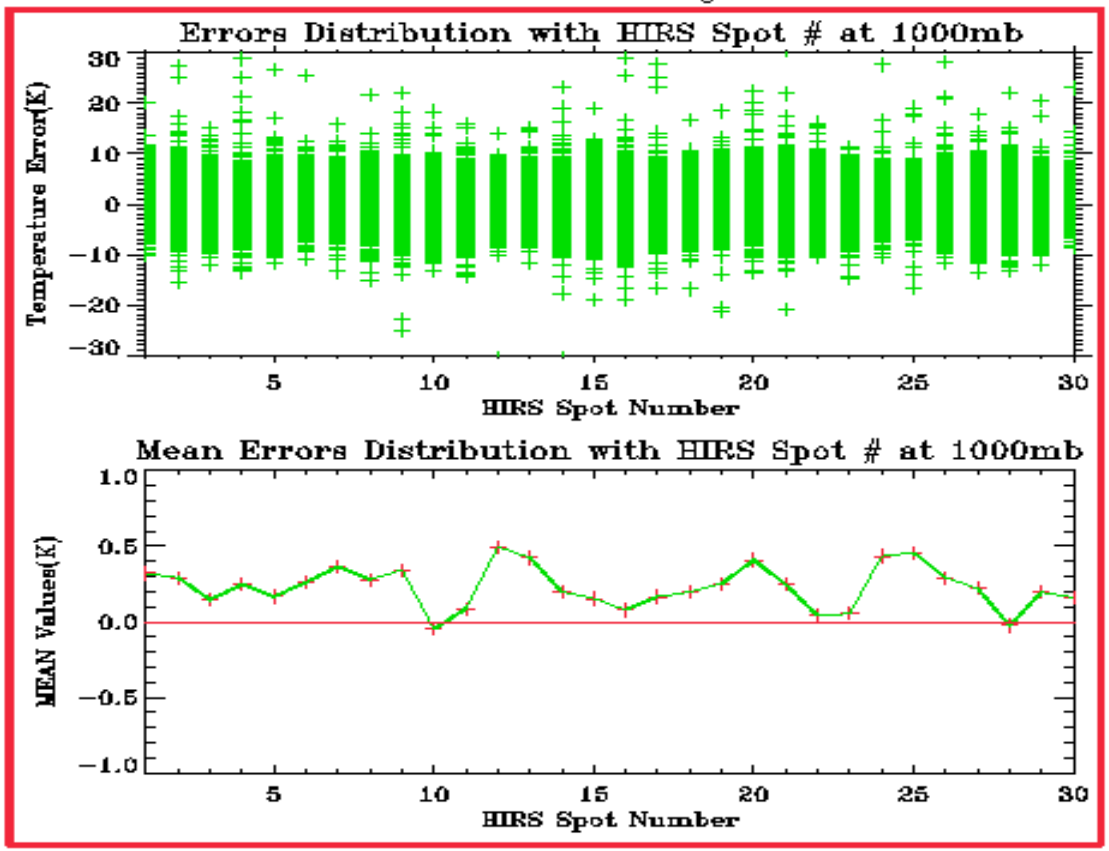

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Lessons Learned

- Samples of validation studies
  - Error increases with time over land
  - Time difference is not large factor over water
  - There is an East - west gradient due to time of day over land
  - There is an equator to pole ward bias due to the temperature gradient
    - Note – this is not a true error
  - Retrievals are colder at night over land

Plans

- Run with HIRS
- Complete the satellite data specification
- Add capabilities